

ASBESTOS: INSIDE AND OUTSIDE, TOXIC AND HAPTIC

Sasha Litvintseva

Film Studies, Queen Mary University of London, UK

Abstract Asbestos is a fibrous mineral. Airborne asbestos—similar to nuclear radiation and chemical atmospheric pollutants—is invisible to the naked eye, and living and breathing alongside it has deferred toxic effects on human bodies. The toxicity of asbestos operates by breaching the boundary that appears to separate the insides of our bodies from our outward environments. Asbestos attests to the fact that the human does not just touch the nonhuman, culture does not just touch nature, but the boundaries between them operate within a framework of trans-corporeality, viscous porosity, and reciprocal interpenetration. In this article the author examines the history and materiality of asbestos to theorize toxic embodiment through the mutuality of the haptic sense and the breaching of boundaries of inside and outside. The author develops this through an analysis of her own film project *Asbestos* (2016), shot at the mining town of Asbestos, Quebec, mobilizing a discussion of haptic visuality to theorize toxic embodiment in its relationship to reciprocity, vulnerability, and responsibility. In the case of asbestos, the boundary of inside and outside traverses a series of unfolding scales: from the boundedness of a single cell, to a single organism encased in skin, to a body enclosed in a hazmat suit, to architecture and surrounding space, city and hazardous-waste landfill site, contaminated and safe, local and global. Asbestos shows that there is no spatial or temporal “outside” in which to deposit toxic materials, and that being an embedded part of the environment means there is no “outside” to either vulnerability or responsibility.

Keywords asbestos, toxicity, hapticity, visibility, practice research

Introduction

Airborne asbestos is a toxic atmospheric threat that is imperceptible to the naked eye and to optical microscopes. It is the combination of the perceptual elusiveness of asbestos with its ability to enter and alter bodies that makes it particularly apt for a study of our—often violent—continuity with our environments.¹ In *Bodily Natures*, Stacy Alaimo argues that “potent ethical and political possibilities emerge from the literal contact zone between human corporeality and more-than-human nature.”² Alaimo proposes the concept of trans-corporeality as a theoretical site that is constituted by a dual recognition that “‘the environment’ is not located somewhere out there, but is always the very substance of ourselves”³ and that “humans are the very stuff of the material, emergent world.”⁴ She argues that toxic bodies in particular—that is, bodies in which the human and the environmental, organic and nonorganic, have become entwined—provide a

direct manifestation of trans-corporeality: “toxic bodies insist that environmentalism, human health, and social justice cannot be severed.”⁵ Taking Alaimo’s concept of trans-corporeality as a point of departure, in this article I examine the history and toxicity of asbestos as a way to further theorize the material interconnections of human bodies and the more-than-human world.

In the first part of the article I examine the materiality of asbestos, its industrial use, toxicity, and the visualizing technologies that provided proof of its toxicity by making its molecular structure visible. I argue that both the toxicity and visibility of asbestos operate in the framework of haptics, that is, pertaining to the sense of touch. In contrast with nuclear radiation, an immaterial ray that interferes with cells on a subatomic level by ionizing particles in them, or plastics and toxic chemicals that interfere with the bloodstream on a chemical level and in some cases triggering hormonal reactions, asbestos is a physical toxicant, meaning its encounter with a biological cell happens on the physical level of material penetration.⁶ In its physical contact with the cell, an asbestos fiber is able to pierce it like a needle and enter it. The visibility of asbestos is similarly granted by transmission electron microscopes that physically send a beam of electrons *through* the object of study, unlike optical microscopes that use light that reflects back off the outer boundary of the object of study. From these properties I begin to theorize asbestos as triggering an understanding of the porousness of the boundaries of inside and outside, crucial for thinking the embodied and the environmental together. The mutuality of the sense of touch and the breaching of boundaries of inside and outside, as enacted by the encounter of asbestos with flesh, form the basis of my conceptualization of toxic embodiment.

In the following section of the article I deepen and elaborate this claim by grounding the discussion in the history and material specificities of the former mining town of Asbestos, Quebec, and of asbestos removal practices, the subjects of my own film project *Asbestos* (2016).

Through an analysis of the film, the filmmaking process, and the practical challenges inherent to an attempt to capture an invisible yet toxic material through optical means, I argue that what is made visible instead are the inextricable points of connection between bodies and environments, materials and their use. I further mobilize a discussion of haptic visuality to theorize toxic embodiment in its relationship to reciprocity, vulnerability, and responsibility. The film also makes visible multiple temporalities inherent to asbestos, its toxicity, and its use, which are the subject of the final part of the article, through a focus on the reciprocal influence between industrial progress and the toxic body. I theorize the temporality of the toxicity of asbestos as one of debt, encompassing the unfolding of the deferred yet certain effects of asbestos on the toxic body and the unpayable debt owed to it by industrial progress. While the physical properties of asbestos and its toxicity are different from most toxic materials, the specific case study of the history of asbestos and the theorization of its toxic hapticity provide insights surrounding vulnerability, responsibility, reciprocity, and temporality that are more broadly applicable and can be mobilized productively toward further theorization of toxic materials and toxic embodiment.

Having been extracted from the earth, asbestos has fostered mining towns and insulation materials, triggered illnesses and removal techniques, traversed inside our homes and inside our lungs, and breached the boundaries of bodies and cells. The penetrating nature of asbestos demonstrates that the thresholds of inside and outside, human and nonhuman, body and environment, city and toxic-waste landfill site, local and global are not definite but porous. We are not able to remain outside of toxic environments any longer than toxic materials remain outside our bodies. We co-emerge with the materials that we mine, manufacture, and mobilize. Can we co-emerge more responsibly? What can the history of the use and disuse of asbestos

reveal about the position of the toxic body in industrial progress? How can the haptic nature of the toxicity of asbestos contribute to a conceptualization of toxic embodiment?

Asbestos: History, Materiality, Toxicity, Visibility, Hapticity

Asbestos is thought to have been discovered and used in Ancient Greece over four thousand years ago, with the earliest uses including cremation cloths and perpetual lamp wicks.⁷ The name itself originates with the Roman natural philosopher Pliny the Elder, and his use of “asbestinon,” Latin for “unquenchable.”⁸ In his *Natural History*, Pliny describes asbestos as the material from which “the corpse-cloths of monarchs are made, to ensure the separation of the ashes of the body from those of the pile.”⁹ He describes nobles and kings entertaining their guests by the spectacle of “napkins that were made of it thrown into a blazing fire, . . . and after the stains were burnt out, come forth from the flames whiter and cleaner than they could possibly have been rendered by the aid of water.”¹⁰ Though he mistakenly identifies the provenance of the material as growing “in the deserts of India, scorched by the burning rays of the sun” and therefore “habituated to resist the action of fire,” cleaning asbestos-cloth clothing in fire rather than water was one of the first potential industrial uses to spark interest in the material in the modern era.¹¹ In a letter published in the *New York Times* in 1866, shortly before the start of large-scale use of asbestos, an entrepreneur writes: asbestos is as “pliant as any silk” and due to “its incombustible nature” it would be able to “set aside the vexatious expense and use of soap and water, for all a lady will have to do when she unrobes herself, will be to pitch her articles of apparel into a glowing fire, and when they have become as white as a snowflake she may resume them at her pleasure.”¹² This application of asbestos never caught on, but in the space of merely a decade asbestos extraction on an industrial scale was already underway. Writing in 1888, Robert H. Jones calls it “one of Nature’s most marvellous productions.”¹³ He writes that with the recent

discovery of abundant deposits he can see “no reasonable limit” being put to the demand, and looks forward to the rapid increase of its potential uses as “its value becomes more clearly and widely known”: an excitement that feels chillingly foreboding with the distance of hindsight.¹⁴ By 1909, “asbestos has been put to a thousand practical uses.”¹⁵ “In London and Paris firemen, clad in asbestos clothing and masks, practically defy the flames, being able to actually pass through the blaze,” and a decade later during the First World War the filters of the first gas masks would also contain asbestos.¹⁶ “Millions of feet of steam pipes, boilers, &c., are covered with asbestos,” and “were it not for the non-conducting and heat-resisting qualities of asbestos,” the emerging proliferation of electrical equipment “would be either put out of commission or completely destroyed by short circuiting.”¹⁷ By the mid-twentieth century asbestos was being widely used as a heat and electric insulator, in brake linings and in construction as a fire retardant in roofing, walls, and floors. Veritably, “of all the queer materials which nature seems to have provided for no other purpose than that man may show his ingenuity in their use, nothing compares to that mineralogical vegetable, asbestos.”¹⁸

Asbestos is not a specific mineral, but rather an umbrella term for a group of silicate minerals with a fibrous structure: chrysotile, amosite, and crocidolite being the most frequently mined and used varieties. Though the formulae for the asbestos minerals show them to contain a number of ubiquitous elements, it is their physical attributes on a molecular level that dictate both their industrial usage and their health hazards. Advances in imaging technology have revealed that these material properties are due to the fact that asbestos minerals are “formed through polymerization, the repetition of a chemical unit in a linear array,”¹⁹ meaning that “a fiber visible to the naked eye is formed by the aggregation of thousands of elongate submicroscopic linear arrays” and can be pulverized indefinitely, breaking down into ever

smaller forms, until you are left with a chain that is one molecule thick.²⁰ As such, it is invisible not only to the naked eye, but also to optical microscopes. The industrial usages of asbestos were indebted to precisely this fibrous nature of the mineral as it allowed the material to be highly flexible, durable, and, crucially, able to be woven into and through any other industrial material from roofing to wall insulation. In other words the industrial uses of asbestos drew on its ability to be highly malleable and able to be materially entangled with other materials, to lose itself in them by making them infused with itself.

The toxicity of asbestos arises out of the very same physical properties: it is the fibrous nature of its molecular structure that allows for its entanglement with organic tissue. The submicroscopic shards of asbestos are a shape and size that make it possible for them to become airborne and, when they come into contact with a human cell, to physically pierce it like a needle. In contrast with nuclear radiation—an immaterial ray that impacts organic matter on a subatomic level by ionizing particles in it, which changes their charge by making them lose or acquire electrons—airborne asbestos is made up of physical particles whose encounter with organic matter is that of a direct physical impact. Though only one molecule thick, and indeed precisely because they are only one molecule thick, shards of asbestos are able to penetrate cells to become “‘foreign bodies’ in the biological environment.”²¹ This initiates “cellular responses to an unexpected trauma, and a normal repair mechanism [is] the deposition of a fibrous protein, collagen, in excessive concentrations at the site of trauma,” which can result in mesothelioma, a cancer of the lining of the lungs from asbestos inhalation, which usually arises out of asbestos exposure that “may have been relatively mild and taken place over 30 years before.”²² More immediate and more common among “those that mined and processed the material,” asbestosis is an often fatal fibrosis of the lungs, caused by excessive forming of scar tissue “to encapsulate the

non-normal additions to the normally soft tissue environment,” which in sufficient quantities deform the lining of the lungs and constrict breathing.²³ When asbestos enters the lungs, it triggers a reaction and is absorbed as the tissue is transformed, forming an aggregate only possible in their connection. Along with Alaimo’s trans-corporeality, the fusion of asbestos with flesh can be conceptualized as part of what Nancy Tuana calls viscous porosity: the viscous porosity of flesh and that of asbestos “allow for an exchange of molecules,” where asbestos passes “through the porosity of skin,” it “becomes flesh.”²⁴ Tuana evokes the idea of *porosity* as “the boundaries between our flesh and the flesh of the world we are of and in is porous,” yet “while that porosity is what allows us to flourish—as we breathe in the oxygen we need to survive and metabolize the nutrients out of which our flesh emerges—this porosity often does not discriminate against that which can kill us.”²⁵ She evokes the idea of *viscosity*, as opposed to *fluidity*, to account precisely for not eradicating boundaries altogether in order to be able to resist that which is toxic, and to resist an erasure of distinctions between those most affected and those responsible.

The history of asbestos-related illness is as long as the history of its use: “since the first century A.D. it was suspected that asbestos might be the cause of illness among those who mined and processed the material.”²⁶ Dangers of asbestos exposure, and therefore associated health complications, are unevenly distributed, with workers at asbestos mines, refineries, and now abatement and removal industries being most at risk. The first cases of asbestos-related deaths in asbestos processing factories were documented in the nineteenth century, and in the 1920s the “number of deaths at T&N’s Rochdale plant, near Manchester, led to the first medical descriptions of asbestosis.”²⁷ And yet asbestos extraction and use continued to grow until the mid-twentieth century. It was not until 1972 that restrictions on the amount of airborne asbestos

allowed in the workplace began to be put in place, becoming progressively stricter over the following decades, before asbestos was officially banned in EU member states in 1999. Though these official restrictions followed the revelations of asbestos's molecular structure, and therefore scientific proof of its toxicity, they also followed decades of legal and activist struggle.²⁸ These are struggles that continue to this day, for the history of the use and disuse of asbestos is also geographically uneven, as "advances in occupational health in certain parts of the world have gone hand-in-hand with testimonies to the alleged safety of working with asbestos in other parts of the world."²⁹ Canada, once the producer of forty percent of the world's asbestos, only stopped extraction in 2012, having for decades exported it despite the ban on domestic use. I will further elaborate on the Canadian context in the following part of the article.

The invisibility of asbestos, or rather its visual elusiveness when it comes to the naked eye and optical microscopes, played a key role in the history of its use and disuse. The placement and subsequent enforcement of restrictions on airborne asbestos would not have been possible without the invention of the transmission electron microscope, which allowed for its detection. It was also thanks to progress in imaging technologies, from the transmission electron microscope and spectroscopy to electron diffraction, that the physical properties of both asbestos molecules and human cells, as well as the relationship between the two, could be understood better. While optical microscopes use glass lenses to focus light on the object of study, which then reflects back, transmission electron microscopes use electromagnetic lenses to focus a beam of electrons that travels *through* the object of study. In this sense, as Karen Barad suggests, an image created through electron microscopy "is more aptly likened to an encounter that engages the sense of touch rather than sight,"³⁰ as it is achieved through physical contact of the object of observation and the tool of observation. The transmission electron microscopes challenged the conception of

vision as an immaterial perceptual sense that remains on the outside of the objects of observation: on the molecular level visibility is haptic. Further, just as asbestos itself materially traverses the boundaries of inside and outside, the technology that makes it visible penetrates through the object of observation, rather than observing it from the outside. The visibility and the toxicity of asbestos are thus both manifested through touch, and in both cases they demand a reconsideration of hapticity that goes beyond ideas of surface.

Touch is a sense that is by definition mutual: if you touch something, it touches you. Unlike the visual sense, which “permits a transcendent, distant and arguably disconnected, point-of-view, the haptic sense functions by contiguity, contact and resonance.”³¹ As Eva Hayward writes of the haptic-optic quality of the sensibilities of the *Balanophyllia elegans* corals, and of the mutuality of the sensing between the animal subjects and human scientists, “impression registers the reciprocal nature of being touched in the act of touching, as well as the double meaning—as in “having an impression of me” or “making an impression on me”—of knowing and being.”³² Ordinarily the event of a touch occurs on the surface of the body, when an outer boundary of one body comes into contact with an outer boundary of another body. Asbestos, however, is able to breach the boundaries of our bodies as a material manifestation of trans-corporeality. In the context of toxic embodiment, therefore, a new understanding of the experience of touch is needed to account for that which is already inside our bodies. Asbestos is able to enter bodies and interfere with them on a cellular level, destabilizing the integrity of what appears to be singular and bounded, and showing that our physical insides are not separate from our outward environments. Both the toxicity and visibility of asbestos are manifest in the physical contact of two material entities: the fiber and the cell in the case of toxicity, and the fiber and the beam of electrons that passes through it in the case of visibility. It is the mutuality

of touch in tandem with the breaching of the boundaries of inside and outside, which unite the material and visual qualities of asbestos, that form the foundation of my conceptualization of toxic embodiment. In the following section I develop this further through grounding the discussion in a specific location and a specific practice, and through considering toxicity through haptic cinematic perception, which Laura U. Marks suggests can provide a space to “experience touch both on the surface and inside our bodies.”³³

Asbestos, Quebec, and Asbestos Removal: Local and Global, Inside and Outside, Toxic and Haptic

The initial investigations into the physical properties and health hazards of asbestos required melding “together perhaps the widest range of scientific views that had heretofore existed,” resulting in a close collaboration between scientists from a range of disciplines, from molecular physicists and mineralogists through to pathologists and epidemiologists.³⁴ Given the importance of vision, visibility, and optics to the history of asbestos, I believe that an examination of asbestos through a visual medium such as film has much to add to this interdisciplinary discussion. Specifically, a practice-based cinematic investigation of asbestos has provided multiple perspectives through which to deepen the discussion of toxic embodiment. First, there is the perspective of the filmmaker and the challenge of using an optical medium to approach an object of inquiry that specifically evades optical apparatuses. Immediately the focus has to shift away from the invisible material and toward the possibility of depicting its effects, its production, its material legacy: asbestos had to be depicted in its relationality. The film had to traverse the boundaries asbestos has traversed. This necessary shift of focus to the environments, bodies, and practices that have been touched by asbestos ultimately points to the necessity of their inclusion in any discussion of toxic materials. Further, there is the perspective of the viewer and the embodied knowledge generated by the perceptual experience of the film. Thomas

Elsaesser and Malte Hagener write on the potential of cinematic perception: “film and spectator are like parasite and host, each occupying the other and being in turn occupied, to the point where there is only one reality that *unfolds* as it *enfolds*, and vice versa.”³⁵ Such a provocation with regard to the reciprocity between parasite and host opens up the potential for a deepening of the discussion of the mutuality of the haptic encounter characteristic of toxic embodiment through haptic cinematic perception. And finally, there is the perspective of the film in its material form and the entropy it is subject to, which will be discussed in the final part of the article.

The resultant film research project *Asbestos* (2016), made collaboratively with Graeme Arnfield, is a twenty-minute experimental documentary. It is not a documentary in any straightforward sense: it did not set out to procure information or evidence through interview or intervention. Rather its aim was, in embracing the practical challenges detailed above, to aid in deepening the discussion around the issues of the haptic breaching of boundaries of inside and outside. The film unfolds by oscillating between observational footage I shot in Asbestos, Quebec, of the marks made on the town by a history of asbestos mining, and archival footage of the practice of asbestos removal. The footage of removal was gathered on Youtube, and it ranges from high-budget instructional films made by asbestos removal companies to incidental footage recreationally shot by the workers themselves. Crucially, all this footage spans locations and decades, in contrast to the localized footage from Asbestos, Quebec. As Alaimo writes, “Matters of environmental concern and wonder are always ‘here,’ as well as ‘there,’ simultaneously local and global,” and “although trans-corporeality as the transit between body and environment is exceedingly local, tracing a toxic substance from production to consumption often reveals global networks of social injustice, lax regulations, and environmental degradation.”³⁶ Toxic materials

and toxic bodies draw the local and the global into an entangled proximity. In the case of asbestos, while the minerals themselves are relatively “widespread in nature,” “mining is economical only when they occur as continuous fibrous aggregates (veins) cross-cutting rock masses,” a comparatively rare phenomenon of mantle formation.³⁷ Large-scale asbestos mining only took place in a handful of locations and the material was then distributed around the world. As a result, asbestos removal is an ongoing global practice. Though revelations of its toxicity empowered worker movements to demand a number of countries to halt extraction from the earth, the asbestos industry continues: some of it has merely relocated out of the developed nations, and much of it has shape-shifted into an asbestos removal industry, where extraction from the earth has been replaced with equally industrialized extraction from the walls. The film *Asbestos* centers on these two types of extraction in an attempt to articulate the oscillating poles of asbestos: at once local and global, situated and dispersed, static and mobile, latent and current, imperceptible and material.

We chose to shoot the film in Asbestos, Quebec, as it embodies the *here* of the *everywhere* of asbestos. Asbestos, Quebec, is home to the Jeffrey Mine, the largest asbestos mine in the world and, as Jessica van Horssen puts in her study of the town’s history, *A Town Called Asbestos (TCA)*, “the source of the community’s pride and sorrow, success and decline” (*TCA*, 15). The Jeffrey Mine was opened in 1881 with merely fourteen men, expanding to seventy by 1885 to become the world’s leading producer of asbestos by 1896 (*TCA*, 19–28). Asbestos was finally incorporated as a town in 1899 and grew to a community of ten thousand by 1905. During the early decades of the twentieth century, Asbestos, Quebec, was providing up to 80 percent of the global asbestos supply. The Second World War saw an increase in the demand for asbestos and by the time of the war’s end a quarter of the mine’s employees were women. Around the

same time the community of Asbestos was beginning to feel concern toward the health hazards of asbestos, and in 1949 the workers of the Jeffrey Mine went on a five-month strike demanding better health conditions. The strike choked up the global supply of asbestos, which has led historians to view it “as a turning point in the history of the working class in Canada” (*TCA*, 14). Yet despite the increasingly deteriorating health of the townspeople of Asbestos throughout the first half of the twentieth century, there were no officially recorded asbestos-related deaths in Canada until the 1970s. This was partially due to the way “matters of risk and health have historically been viewed in terms of class,” and the way “people expect miners to get sick, as if it is part of their job” (*TCA*, 10). It was also largely due to an aggressive campaign of misinformation with regard to the detrimental effects of asbestos on human health funded by JM, the company running the Jeffrey Mine. In the 1950s JM hired medical professionals to attribute the lung cancer common among the mine workers to their cigarette smoking habits, and to smuggle up to seventy lungs of deceased miners into the United States in order to study the relationship between asbestos and cancer in anonymity, and without notifying or compensating the victims’ families (*TCA*, 9). As asbestos particles breached the boundaries of the workers’ lungs, the corporation breached national boundaries to obscure the visibility of its toxicity.

Strikingly, rather than view themselves as victims of an occupational health hazard, the workers and residents of Asbestos were themselves “focused almost entirely on the success of the Jeffrey Mine” (*TCA*, 8). Toxic embodiment in this instance becomes difficult to distinguish from what could be thought of as a form of psychological toxic embodiment latent in the capitalist reconfiguration of the relations between human and environment: a psychological suspension that put profit and growth over health and survival. In 1975, as the Jeffrey Mine began laying off workers due to a dwindling global demand for asbestos, the miners went on

strike once again, but this time to demand job security, not better health conditions. “As the industry rapidly declined around them, Jeffrey Mine workers became its biggest advocates, minimizing the risks it posed and using their own bodies to show they were unaffected by asbestos-related disease,” yet much of these efforts were based on the misinformation about the effects of asbestos provided to the workers by JM (*TCA*, 15). In 1983 JM filed for bankruptcy and sold the mine, and from then until 2012 the town received subsidies from the local and federal governments in order to keep the Jeffrey Mine operational (*TCA*, 13). Although domestic use of asbestos in Canada and its heretofore primary importers in the West had ceased by the 1980s, the Jeffrey Mine only stopped extraction in 2012, having exported the ore to developing nations. “Canada exploited its generally positive international image to cast shadows over medical reports proving the dangers of asbestos,” in order to be able to generate continued demand for asbestos and “sell the mineral to developing countries, where workers and other citizens were neither adequately informed about the risks nor protected from them” (*TCA*, 13). As Kathleen Ruff shows in her report on the events leading up to the Canadian ban of asbestos, the Canadian government founded, and until 2009 funded, the Asbestos Institute, later renamed the Chrysotile Institute to avoid negative association, which bribed scientists into publishing misleading research in attempts to undermine the scientific consensus around the dangers of asbestos.³⁸ Furthermore, in 2006 the Canadian government instrumentalized their perceived international goodwill to play a key role in suppressing an amendment to the Rotterdam convention on harmful materials to include asbestos, which in itself would not impose a ban, but merely require “exporting countries to obtain Prior Informed Consent from any country to which they wish to export the hazardous substance.”³⁹

The importing countries, however, have their own anti-asbestos movements, such as the Ban Asbestos Network of India, which “have been demanding and struggling to get it banned to save citizens, consumers and workers who are dying a painful death due to exposure to carcinogenic fibers of” imported asbestos.⁴⁰ The continuation of asbestos mining in Quebec was a public health hazard worldwide, and although its termination depended on a decision made by the local government, it was instigated by an “advocacy campaign involving international solidarity, the scientific community, activists, and asbestos victims.”⁴¹ Ordinarily asbestos victims organizations and trade unions would take a leading role in initiating anti-asbestos campaigns. Quebec and Canada, however, presented a special case where there were no asbestos victims organizations and the trade unions were in fact part of the pro-asbestos lobby.⁴² This was partially due to the repression of anti-asbestos information, and partially due to the fact that “the workers themselves were co-owners of Jeffrey Mine Inc. through a co-operative which bought 35% of the company shares to rescue the mine from bankruptcy in 2002,” and were “as they saw it, fighting for their jobs and the survival of their community.”⁴³ The efforts to ban asbestos had to depend on appealing to the progressive values of “international solidarity, human rights, scientific integrity, and worker health” as aimed at the Canadian people by the world trade union movement, most prominently Indian asbestos victims, trade unionists, and activists, and undersigned by numerous respected international and Quebecois scientists.⁴⁴ Ultimately, the battle was won in the court of public opinion, which had for decades been skewed by government-funded misinformation. In 2012 the Jeffrey Mine was due a \$58 million loan from the Conservative government in order to continue operations for another twenty years, which was cancelled later that year with the election of Parti Quebecois in Quebec and Justin Trudeau’s Liberal party in federal government, both parties having run campaigns that promoted the

asbestos ban.⁴⁵ The Jeffrey Mine was immediately shut down and asbestos was officially banned in Canada by 2018.

Currently, the town of Asbestos, Quebec, is declining in population, yet the community persists thanks to the introduction of other small-scale industries. The century-long history of asbestos mining marks every aspect of life in the town and much of the above history is visually manifest, from the gaping two-kilometer-wide cavity of the mine to other material traces of asbestos that cannot be erased (fig. 1). The name of the town, itself a reminder of the misguided pride and hope that is characteristic of the history of this “magic mineral,” is prominently displayed on flowerbeds, lamppost flags, and signage (fig. 2). The Laundromat, the hospital, and the bowling alley all sport the word “asbestos” in their names; the supermarket parking lot wall is covered by a mural celebrating the mining history of the town; and one newly painted asbestos hauling truck has the pride of place in front of the town hall (fig. 3). The town itself exists as a consequence of the presence of asbestos in the ground beneath it, and though these material impressions made by asbestos on the surface of the town are specific to it, they speak to the marks left by asbestos on innumerable towns and cities around the world. The geographical distribution of toxic materials adds another layer to the understanding of the reconfiguration of the boundary of inside and outside: there is no outside, or what Timothy Morton calls “some illusory beyond,” into which to deposit toxic materials, they are inside our environments as much as we are.⁴⁶ In the case of asbestos, the boundary of inside and outside traverses a series of unfolding scales: from the boundedness of a single cell, to a single organism encased in skin, to a body enclosed in a hazmat suit, to the walls and roofs, architecture and surrounding space, city and hazardous-waste landfill site, contaminated and safe, local and global.

In the film, the footage from Asbestos, Quebec, is heavy, static, and unpopulated: it is an immovable dot on the map compared to the journey of its mineral product. The archival footage of removal, which makes up the rest of the film, is on the other hand embodied, dynamic, and full of bodies. The bodies of the workers, however, are visually accessible to us only as mediated through the hazmat suits that cover them, just as they are physically mediated to the toxic atmospheres they occupy (fig. 4). In removal the materiality of asbestos transforms. When “contained and stable, asbestos is and was a protective, potentially life-saving material,” that “facilitated light, warmth, comfort, and convenience, as well as fire protection:” while functional, asbestos is contained and external to us.⁴⁷ Airborne fibers, on the other hand, are submicroscopic, invisible, dispersed, and bear the potential to enter us and commingle with our tissue. During the practice of removal the potential for submicroscopic asbestos fibers to pass from stable to airborne warrants the mobilization of a highly material infrastructure—from hazmat suits and breathing apparatuses to plastic that is wrapped around objects and walls—in order to maintain the separation of body and asbestos, inside and outside, to counteract the boundary-crossing toxicity of asbestos. In the footage of removal this material infrastructure of protective layers of plastic becomes a visual manifestation of airborne asbestos fibers, of an atmosphere that is imperceptible but nevertheless there and toxic.

Meanwhile, the archival quality of the images testifies to the dispersed and durational nature of the practice of removal, and the ongoing global persistence of asbestos: in the array of film and video formats, from 16mm to HD, it is evident that this process has been unfolding for many decades, from the beginnings of asbestos regulation in the 1970s to the present day. One of the crucial contrasts between this footage and that from Asbestos, Quebec, is to do with the issues of presence and absence, of accounting for “where we are and are not.”⁴⁸ My physical

presence as the filmmaker creating the images of Abestos, Quebec, is contrasted with the inaccessibility of the toxic spaces of removal, reachable only through found images. My attempts to document removal practices in person have been thwarted by removal companies due to risk of exposure. In the film the way the images of removal formally declare themselves to be archival, and in many cases evidently made by the workers themselves, further testifies to the invisible toxicity of the presence of asbestos. The only bodies visible in these images are the bodies of the workers, part of whose job is to risk toxic exposure.⁴⁹ In shot after shot the workers are seen laboriously putting on layers of protective gear, asbestos being removed from walls, floors, and ceilings, entire houses being wrapped in plastic, and that plastic being violently torn down. A number of the shots are made by the workers wearing GoPro cameras on their heads, and have a visceral and vertiginous quality to them that situates the viewer's body in a first-person perspective inside the toxic atmosphere (fig. 5).

In her theory of haptic cinematic images, Marks proposes that “in haptic *visuality* the eyes themselves function like organs of touch.”⁵⁰ Marks delineates the difference between optical and haptic images by the relationships they forge with the viewer: where in the case of optical images this is a unidirectional relationship of objectification and mastery, haptic *visuality* encourages a relationship of mutuality, “an exchange between two bodies—that of the viewer and that of the film.”⁵¹ Yet while there is an exchange between viewer and film, as between body and asbestos, it is not on any straightforwardly reciprocal terms: the viewer and the body are the host, the image and the asbestos—the parasite. Further, the touch of the image does not involve physical contact and the touch of asbestos is imperceptible. In this sense a cinematic experience is a useful tool for thinking through a haptic encounter with a toxic atmospheric threat, which is not mutual in the way that physical touch between two solid bodies of comparable size is. As

Barad writes in her essay “On Touching,” which complicates the way touch is understood in classical physics, “What would it mean to acknowledge that responsibility extends to the insensible as well as the sensible, and that we are always already opened up to the other from the ‘inside’ as well as the ‘outside?’”⁵² In considering touch from the perspective both of outside boundaries and their breaching, both the perceptible and the imperceptible, what Barad highlights is the responsibility that comes with vulnerability: “The sense of exposure to the other is crucial and so is the binding obligation that is our vulnerability.”⁵³

How can the viewer of the film or the body exposed to a toxic atmosphere gain agency and become more than a receptacle for images or toxic materials?

Exhibiting the film in the physical space of a gallery has provided an opportunity to further question what might constitute mutuality and the negotiation of inside and outside in the visual and toxic haptic encounters. The final shot of the film travels through a labyrinthine interior where the walls, floors, and fixtures of every room and corridor are wrapped in red plastic in preparation for asbestos removal from the ceilings. In the exhibition we physically recreated this pictorial space as an immersive installation by wrapping the walls and floors of the first three rooms of the gallery in red plastic, which the viewer had to travel through to arrive at the final darkened room where the film was projected. Every visitor was given a red hazmat suit to wear for the duration of their visit (fig. 6). In this way, not only did every viewer’s embodied presence in a hazmat suit serve to heighten the sensorial dimensions of their own experience, but crucially they became part of the visual experience of other visitors. The mutuality of the experience arose not between the viewer and the content of the exhibition, which is a body and a proxy for a toxic atmosphere, but among a community of bodies engaged in relations of reciprocity.

Thinking back to the history of Asbestos, Quebec, the complexity of the reciprocity of vulnerability and responsibility comes into play. In trying to defend the mine in the name of their community despite the evident danger to their own health, “the people of Asbestos entered into a relationship of mutual exchange with the land, shaping it and being shaped by it,”⁵⁴ a reciprocal double bind with the toxic material that both threatened their community and “gave their community purpose.”⁵⁵ Yet the double bind between the town and the toxic material resulted in a violent equilibrium of continued extraction; it was only in encountering the vulnerability to the toxic material in another that change could be brought about. The community of bodies sharing a toxic atmosphere in this case was not just limited by the outer boundary of the town of Asbestos, but included the whole developing world.

Asbestos Temporality: Industrial Progress and the Toxic Body

In a recent article in the *Guardian* entitled “The Death of Diesel: Has the One-Time Wonder Fuel Become the New Asbestos?” asbestos is used as an analogue for a newly failed promise.⁵⁶ The logic of infinite growth implicit in capitalism and industrial progress craves magical and wondrous materials, which it requires as resources and leaves behind as waste. Yet the unintended consequences of materials such as diesel, which was marketed and subsidized as a green alternative to petrol but turned out to be more toxic than regular fuel, and asbestos, which causes deadly illness, have a markedly different relationship to futurity than that implied by the capitalist logic of infinite growth, which is instead defined by (un)certainty and finitude. In *Politics of Nature* Bruno Latour uses asbestos as a quintessential example of a matter of fact, as he draws a differentiation between matters of fact and matters of concern. He defines matters of fact as “risk-free objects,” with defined properties and belonging to the world of things and of causality, whose production and producers remain out of sight, and whose unintended

consequences exist as if in a parallel universe to the understanding and proliferation of the objects themselves.⁵⁷ Asbestos, according to Latour, was one such object, as it took decades of public health alerts and scandals to bring it and its production and producers into view, “before work-related illnesses, cancers, and the difficulties of asbestos removal ended up being traced back to their cause and counted among the properties of asbestos, whose status shifted gradually” from nature’s most wondrous production to a matter to be taken care of.⁵⁸ In this final part of the article I consider the intersection of the two sides of asbestos temporality: on the one hand the reversal of its industrial history due to the unintended consequences of its toxicity, and on the other hand the latency of its toxicity once it has breached inside a body.

Some of the archival footage that appears in the film *Asbestos* originates from an amateur 1980s educational documentary. Shot on VHS, the magnetic tape has deteriorated over time, and the damage to the surface of the physical carrier of the moving images is made visible in their distorted colors: flesh color is blue, much else is grey scale with occasional bursts of bright yellow, turquoise, and purple (fig. 7). In one of the scenes the presenter speaks directly to camera of the insidiousness of the delayed deadly effects of asbestos. His skin color bright blue, he says: “I sometimes wish that when we humans were exposed to asbestos, that somehow or another we would turn green or blue immediately, so that we’d know we’d had the asbestos exposure and possibly could do something about it.” What he wishes could be possible in order for asbestos exposure to be detectable before its certain yet deferred effects appear with the passage of time, has with retroactive irony in fact happened through the effect of entropy on the footage. In other words, the degradation of the materiality of the tape that carries the image manifests on the body of the presenter the deferred effects that asbestos exposure would on the lungs of which he speaks. These compromised images are able to communicate the two sides of asbestos

temporality: in preserving the ability to relay their content the images attest to the original intentions of their creators, a temporality imposed on them from the outside just like the extraction and industrial use was imposed on asbestos, and in their degradation they attest to the temporality that emanates from inside the nature of their materiality, and thus communicates the latent temporality inherent to asbestos. Indeed, as Jean-Francois Lyotard writes, “contemporary physicists tend to think that time emanates from matter itself,”⁵⁹ and Barad similarly argues that matter is not outside of time but that “matter is always already an ongoing historicity.”⁶⁰ The damaged footage attests to the way toxic materials are not inert objects that can be slotted into history and the narrative of industrial progress, but rather that new histories and temporalities are set in motion with every encounter of a toxic material with organic matter.

Once asbestos particles have breached biological cells, processes are set in motion that make some aspects of the future guaranteed. Deferred yet certain, the temporality of asbestos toxification of the body is like the temporality of debt-repayment, so common now—from individual mortgages to the economies of developing nations—as a picture of a future that “is literally locked into the debt repayment obligation.”⁶¹ Indeed, “debt” is being widely used in official climate change discourse to differentiate between the responsibilities of developing and industrialized nations. The concept of debt as applied to a conceptualization of environmental degradation and toxification helps to position those most responsible and those most vulnerable, to whom the unpayable debt is owed. Ecological catastrophe and the toxification of environments tend to happen at the pace of what Rob Nixon terms slow violence, a “violence that occurs gradually and out of sight.”⁶² The temporality of such violence often operates at odds with the temporal scale or parliamentary terms of party politics. As Nixon argues “casualties from slow violence are” out of sync “with the swift seasons of electoral change,” as politicians

are unwilling to take actions that may be economically unpopular in the short term, and only pay off environmentally “on someone else’s watch decades, even centuries, from now.”⁶³ The history of the use and disuse of asbestos gives us a glimpse into the workings of the temporality of ecological debt and with it a glimpse into our future: unless politically mobilized now, the centuries that lie ahead will spell ecological catastrophe—the uncertain future of ecological collapse will certainly take place. In the case of asbestos, the site on which the slow violence of the toxic debt unfolds is the toxic body. Economic demands for exponential expansion come into conflict with a material history that begins unfolding within the body after contact with asbestos. Ultimately, as the history of the reversal of the asbestos industry due to the success of activist movements shows, the future unfolding inside the toxic body has the potential to change industrial history at large.

Conclusion

The toxic hapticity of asbestos operates by breaching of the boundary that appears to separate the insides of our bodies from our outward environments. Asbestos attests to the fact that the human does not just touch the nonhuman, culture does not just touch nature, but the boundaries between them operate within a framework of viscous porosity and reciprocal interpenetration. The negotiation of the boundary of inside and outside extends from the breaching of the boundary of a single cell by a submicroscopic shard of asbestos to the spatial and temporal qualities of asbestos as it disperses around the world and projects itself into the future. Once removed from buildings, asbestos and asbestos-infused materials need to be safely disposed of. It is most commonly buried in hazardous-waste landfill sites, a final turn of decontextualization after it has been extracted from the ground to be placed in the outward boundaries of human dwellings, whence it is extracted again to be placed back in the ground. However, this practice does not take

away from the potential toxicity of the material and remains safe only as long as the deposits remain undisturbed. Indeed, asbestos shows that there is no “outside” in which to deposit our toxic materials: they remain inside our environments and iteratively harbor the potential to enter inside our bodies. This realization has broader implications for environmental sustainability, as Alaimo writes, “the traffic in toxins may render it nearly impossible for humans to imagine that our own well-being is disconnected from that of the rest of the planet.”⁶⁴ Being always and already an embedded part of the environment means there is no “outside” to either vulnerability or responsibility. Further, when it comes to cohabiting alongside existing toxic materials and imagining a future among environmental degradation already on the way, a livable future will not come from the outside. The intentions thrust onto materials by industrial capitalism will have to be balanced against the unintended consequences emerging from inside the encounter of toxic materials with the flesh of the world. As a way to situate the connection between the two, the film and exhibition *Asbestos* provided a perceptual framework within which to contemplate the otherwise insensible toxic material such as asbestos, and understand it as continuous with the relationality of human bodies and environments.

SASHA LITVINTSEVA is a filmmaker and researcher whose work is situated on the uncertain thresholds of human/nonhuman, inside/outside and perceptible/communicable. She is a lecturer in Film Studies at Queen Mary University of London and is currently completing a PhD proposing the concept of geological filmmaking at Goldsmiths. Her film work has been exhibited worldwide including Berlinale, Rotterdam International Film Festival, Institute of Contemporary Art, London, Mumok, Vienna, Videobrasil, The Moscow Biennale for Young Art, Contemporary Art Museum, Chicago.

Acknowledgments

Early iterations of this research have been presented at the Digital Ecologies in the Anthropocene symposium at Bath Spa University and the Object! Documentary as Art event at the Whitechapel Gallery. I would like to thank the special issue editorial team and anonymous reviewers for their engaged comments that helped me to clarify my argument. And most importantly I wish to thank

my supervisors Joanna Zylinska and Rachel Moore, my partner Beny Wagner, my collaborator Graeme Arnfield, and my colleagues at Skwod for continued support, advice, and inspiration.

References

- Alaimo, Stacy. *Bodily Natures: Science, Environment, and the Material Self*. Bloomington: Indiana University Press, 2010.
- Alleman, James E., and Brooke T. Mossman. "Asbestos Revisited." *Scientific American* 277 (July 1997): 54–57.
- Anonymous, "Asbestos." *New York Times (1857–1922)*, August 19, 1866. ProQuest Historical Newspapers: *New York Times*.
- Anonymous, "Paradoxical Asbestos." *New York Times (1857–1922)*, November 21, 1909. ProQuest Historical Newspapers: *New York Times*.
- Barad, Karen. *Meeting the Universe Halfway: Quantum Physics and the Entanglement of Matter and Meaning*. Durham: Duke University Press, 2007.
- Barad, Karen. "On Touching—The Inhuman That Therefore I Am (v1.1)." In *Power of Material/Politics of Materiality*, edited by Susanne Witzgall and Kerstin Stakemeier, 153–64. Zurich: Diaphanes, 2018.
- Daston, Lorraine, and Katharine Park. *Wonders and the Order of Nature: 1150–1750*. New York: Zone, 1998.
- Elsaesser, Thomas, and Malte Hagener. *Film Theory: An Introduction Through the Senses*. New York: Routledge, 2015.
- Fisher, Jennifer. "Relational Sense: Towards a Haptic Aesthetics." *Parachute Magazine*, no. 87 (Summer 1997): 4–11.

Forrest, Adam. "The Death of Diesel: Has the One-Time Wonder Fuel Become the New Asbestos?" *Guardian*, April 13, 2017.

<https://www.theguardian.com/cities/2017/apr/13/death-of-diesel-wonder-fuel-new-asbestos>.

Gregson, Nicky, Helen Watkins, and Melania Calestani. "Inextinguishable Fibres: Demolition and the Vital Materialisms of Asbestos." *Environment and Planning A* 42 (2010): 1065–83.

Haraway, Donna. "Situated Knowledges: The Science Question in Feminism and the Privilege of Partial Perspective." *Feminist Studies* 14, no. 3. (1988): 575–99.

Haraway, Donna. *How like a Leaf*. Interview by Thyra Nichols Goodeve. New York: Routledge, 1998.

Hayward, Eva. "Fingeryeyes: Impressions of Cup Corals." *Cultural Anthropology* 25, no. 4 (2010): 577–99.

Jones, Robert H. *Asbestos: Its Production and Use*. London: Crosby Lockwood and Son, 1888.

Krishna, Gopal. "India and BRICS Should Pay Heed to Brazilian Supreme Court's Ban on Asbestos Declaring Even 'Controlled Use of Asbestos' as Unconstitutional." Ban Asbestos India, November 4, 2017, <http://www.asbestosfreeindia.org/>.

Latour, Bruno. *Politics of Nature: How to Bring the Sciences into Democracy*, translated by Catherine Porter. Cambridge, MA: Harvard University Press, 2004.

Lyotard, J.-F. *The Inhuman: Reflections on Time*, translated by Geoffrey Bennington and Rachel Bowlby. Stanford: Stanford University Press, 1991.

Marks, Laura U. "Video Haptics and Erotics." *Screen* 4, no. 39 (1998): 331–48.

- McCulloch, Jock. "Dust, Disease, and Labour at Havelock Asbestos Mine, Swaziland." *Journal of Southern African Studies* 31, no. 2 (2005): 251–66.
- Morton, Timothy. "Zero Landscapes in the Time of Hyperobjects." *Graz Architectural Magazine*, no. 7 (2011): 78–87.
- Nixon, Rob. *Slow Violence and the Environmentalism of the Poor*. Cambridge, MA: Harvard University Press, 2011.
- Pliny the Elder. *Natural History*, translated and edited by John Bostock and H. T. Riley. London: Taylor and Francis, 1855.
- Ross, Malcolm, and Robert P. Nolan. "History of Asbestos Discovery and Use and Asbestos-Related Disease in Context with the Occurrence of Asbestos within Ophiolite Complexes." In *Ophiolite Concept and the Evolution of Geological Thought*, vol. 373. edited by Yildirim Dilek and Sally Newcomb, Boulder, CO: Geological Society of America, 2003: 447-470.
- Ruff, Kathleen. "How Canada Changed from Exporting Asbestos to Banning Asbestos: The Challenges That Had to Be Overcome." *International Journal of Environmental Research and Public Health* 14, no. 1135 (2017): 1–9.
- Skinner, H. Catherine W. "Mineralogy of Asbestos Minerals." *Indoor and Built Environ*, no. 0 (2003): 1–5.
- Skinner, H. Catherine W., Malcolm Ross, and Clifford Frondel. *Asbestos and Other Fibrous Materials: Mineralogy, Crystal Chemistry, and Health Effects*. New York: Oxford University Press, 1988.

Tuana, Nancy. "Viscous Porosity: Witnessing Katrina." In *Material Feminisms*, edited by Stacy Alaimo and Susan J. Hekman: Bloomington IN: Indiana University Press, 2008: 188-210.

van Horssen, Jessica. *A Town Called Asbestos: Environmental Contamination, Health, and Resilience in a Resource Community*. Vancouver: University of British Columbia Press, 2016.

¹ These bodies can be both human and nonhuman, as asbestos inhalation has adverse health effects on humans as well as nonhuman animals. However, in both cases the severity and duration of the exposure plays a crucial role, and those most at risk are workers at asbestos mines, asbestos processing factories, and asbestos removal companies. For this reason human and specifically working bodies will be the main focus within the scope of the present article.

² Alaimo, *Bodily Natures*, 2.

³ Alaimo, *Bodily Natures*, 4.

⁴ Alaimo, *Bodily Natures*, 20.

⁵ Alaimo, *Bodily Natures*, 22.

⁶ Two other examples of physical toxicants are coal dust and airborne silica fibers, which in encountering biological matter behave in ways similar to asbestos. My choice of asbestos as a case study, however, is driven as much by its physical properties as by the specificity of the history of its global use and disuse, which I explore in the article.

⁷ Ross and Nolan, "History of Asbestos Discovery and Use;" Daston and Park, *Wonders and the Order of Nature*, 89.

⁸ Alleman and Mossman, "Asbestos Revisited."

- ⁹ Pliny the Elder, *Natural History*, book 19, chap. 4.
- ¹⁰ Pliny the Elder, *Natural History*, book 19, chap. 4.
- ¹¹ Pliny the Elder, *Natural History*, book 19, chap. 4.
- ¹² Anonymous, “Asbestos,” 5.
- ¹³ Jones, *Asbestos*, 5.
- ¹⁴ Jones, *Asbestos*, 6.
- ¹⁵ Anonymous, “Paradoxical Asbestos,” 6.
- ¹⁶ Anonymous, “Paradoxical Asbestos,” 6.
- ¹⁷ Anonymous, “Paradoxical Asbestos,” 6.
- ¹⁸ Anonymous, “Paradoxical Asbestos,” 6.
- ¹⁹ Skinner, Ross, and Frondel, *Asbestos and Other Fibrous Materials*, 11.
- ²⁰ Skinner, Ross, and Frondel, *Asbestos and Other Fibrous Materials*, 11.
- ²¹ Skinner, “Mineralogy of Asbestos Minerals,” 3.
- ²² Skinner, “Mineralogy of Asbestos Minerals,” 3.
- ²³ Skinner, “Mineralogy of Asbestos Minerals,” 3.
- ²⁴ Tuana, “Viscous Porosity: Witnessing Katrina,” 200–201.
- ²⁵ Tuana, “Viscous Porosity: Witnessing Katrina,” 198.
- ²⁶ Skinner, Ross, and Frondel, *Asbestos and Other Fibrous Materials*, 3.
- ²⁷ McColloch, “Dust, Disease and Labour at Havelock Asbestos Mine, Swaziland,” 258.

- ²⁸ Ruff, “How Canada Changed from Exporting Asbestos,” 3.
- ²⁹ Gregson, Watkins, and Calestani, “Inextinguishable Fibres,” 1066.
- ³⁰ Barad, *Meeting the Universe Halfway*, 52.
- ³¹ Fisher, “Relational Sense,” 6.
- ³² Hayward, “Fingeryeyes,” 581.
- ³³ Marks, “Video Haptics and Erotics,” 332.
- ³⁴ Skinner, “Mineralogy of Asbestos Minerals,” 1.
- ³⁵ Elsaesser and Hagener, *Film Theory*, 12.
- ³⁶ Alaimo, *Bodily Natures*, 15.
- ³⁷ Skinner, Ross, and Frondel, *Asbestos and Other Fibrous Materials*, 6.
- ³⁸ Ruff, “How Canada Changed from Exporting Asbestos,” 4.
- ³⁹ Ruff, “How Canada Changed from Exporting Asbestos,” 4.
- ⁴⁰ Krishna, “India and BRICS Should Pay Heed,” n.p.
- ⁴¹ Ruff, “How Canada Changed from Exporting Asbestos,” 8.
- ⁴² Ruff, “How Canada Changed from Exporting Asbestos,” 2.
- ⁴³ Ruff, “How Canada Changed from Exporting Asbestos,” 3.
- ⁴⁴ Ruff, “How Canada Changed from Exporting Asbestos,” 3.
- ⁴⁵ Ruff, “How Canada Changed from Exporting Asbestos,” 3.
- ⁴⁶ Morton, “Zero Landscapes in the Time of Hyperobjects,” 82.

⁴⁷ Gregson, Watkins, and Calestani, “Inextinguishable Fibres,” 1071.

⁴⁸ Haraway, “Situated Knowledges,” 582.

⁴⁹ An additional detailed discussion of the gender, race, and class of the removal workers, particularly as compared with asbestos mine and refinery workers, would be a further valuable contribution to the discourse surrounding toxic embodiment, but is beyond the scope of this article. It is however of note that in the footage of removal the race and gender of the workers are obscured by the hazmat suits.

⁵⁰ Marks, “Video Haptics and Erotics,” 332.

⁵¹ Marks, “Video Haptics and Erotics,” 338.

⁵² Barad, “On Touching,” 162.

⁵³ Barad, “On Touching,” 162.

⁵⁴ van Horssen, *Town Called Asbestos*, 15–16.

⁵⁵ van Horssen, *Town Called Asbestos*, 10–11.

⁵⁶ Forrest, “Death of Diesel,” n.p.

⁵⁷ Latour, *Politics of Nature*, 23.

⁵⁸ Latour, *Politics of Nature*, 23.

⁵⁹ Lyotard, *Inhuman*, 60–61.

⁶⁰ Barad, *Meeting the Universe Halfway*, 151.

⁶¹ Haraway, *How lke a Leaf*, 99.

⁶² Nixon, *Slow Violence and the Environmentalism of the Poor*, 2.

⁶³ Nixon, *Slow Violence and the Environmentalism of the Poor*, 9.

⁶⁴ Alaimo, *Bodily Natures*, 18.

<figure captions>

Figure 1. Still from *Asbestos*, Sasha Litvintseva and Graeme Arnfield, HD video, 2016, courtesy of the artists.

Figure 2. Still from *Asbestos*, Sasha Litvintseva and Graeme Arnfield, HD video, 2016, courtesy of the artists.

Figure 3. Still from *Asbestos*, Sasha Litvintseva and Graeme Arnfield, HD video, 2016, courtesy of the artists.

Figure 4. Still from *Asbestos*, Sasha Litvintseva and Graeme Arnfield, HD video, 2016, courtesy of the artists.

Figure 5. Still from *Asbestos*, Sasha Litvintseva and Graeme Arnfield, HD video, 2016, courtesy of the artists.

Figure 6. Exhibition documentation, *Asbestos*, Sasha Litvintseva and Graeme Arnfield, Roaming Projects, London, UK, 2017, courtesy of the artists.

Figure 7. Still from *Asbestos*, Sasha Litvintseva and Graeme Arnfield, HD video, 2016, courtesy of the artists.